SET THEORY

A set can be defined as a collection of objects according to a well-defined common element or property. The main purpose of this their common property is for easy identification. For instance, we hear of under 13 football players, meaning "the set of football players" whose ages fall below 13 years.

Notation and Methods of Describing Sets

A set is usually represented by a capital letter, for example, A = the set of even numbers less than 110; B = the set of months of the year.

There are basically three ways of representing sets namely:

1. The set of builder or property form: this describes the elements of the set by referring to their common property. This method of describing a set is called the set-builder method. e.g.

$$W = \{x: x\ is\ the\ day\ of\ the\ week\}$$

2. Also, the above example can be given by the rule method as

$$W = \{the\ days\ of\ the\ week\}$$

3. The roster or tabular or listing method: this method actually lists all the members of the set.

   E.g.

   $W = \{Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday\}$

Using the example above, Monday "is a member of" W. This is denoted as $Monday \in W$ and is read as 'Monday belongs to W' or 'Monday is an element of W'.

If a member 'does not belong to' the set, for example, Ada 'does not belong to' the set of days in the week, this can be denoted by $Ada \notin W$ and is read as 'Ada is not in W' or 'Ada is not as element of W' or 'Ada is not a member of W'.

Generally, the element or members of sets are usually the lower case letters such as a, b, c, d,… while the whole set itself is usually represented with a capital letter A, B, W, Y,….

Finite and Infinite Sets

If the members of a set have a definite number like the days of the week, we term such set finite, otherwise it is infinite like the set of natural numbers or counting numbers.

Examples of finite and infinite sets are as follows:

$$W = \{days\ in\ the\ week\}$$

$$N = \{x \mid x\ is\ a\ multiple\ of\ 2\}$$

W is finite while N is infinite